

FLAT DISPLAY MODULE

INCORPORATION BY REFERENCE

This application is based upon and claims the benefit of 5
priority from Japanese Patent Application No. 2007-181384,
filed on Jul. 10, 2007, the disclosure of which is incorporated
herein in its entirety by reference.

BACKGROUND OF THE INVENTION

1. Technical Field

The present invention relates to a flat display module and in
particular, relates to the reinforcing structure for a flat display
panel with a flexible wiring substrate such as TCP (Tape 15
Carrier Package) and COF (Chip on Film) connected to the
display panel.

2. Background Art

A flat display device such as a liquid crystal display device
(hereinafter, referred to as an LCD device) is widely used in 20
such fields as the office automation equipment, the audio
visual equipment and the portable terminal equipment due to
its beneficial feature such as thin type, light-weight and low
power consumption. This LCD device includes a liquid crystal
display module (hereinafter, referred to as an LCD module) 25
and a backlight module. As is shown in FIG. 7A and FIG.
7B, the LCD module includes a liquid crystal (LC) panel 1, a
pair of polarizing plates 2, and a flexible wiring substrate 4
(hereinafter, referred to as a flexible substrate.) The LC panel
is composed of two transparent substrates sandwiching liquid 30
crystal therebetween. The polarizing plates 2 are disposed on
front and rear surfaces of the LC panel 1. The flexible sub-
strate 4 is provided with a driver IC for driving the LC panel
1.

To make the LCD device thin is a significant issue and thus 35
further thinning of the transparent substrates of the LC panel
is desired. In recent years, accordingly, such thin transparent
substrates as of no more than 0.5 mm thickness have been
used, and more thinner transparent substrates of 0.4 mm or
0.3 mm thickness have been also tried.

By using such thin transparent substrates, a thin LC panel
can be realized. However, breakage or crack at a peripheral
portion of the transparent substrates tends to occur, in par-
ticular, at region adjacent to connecting portion for the flex-
ible substrate due to mechanical pressure caused thereat. 45
The flexible substrate itself tends to brake away from the panel due
to its own cut or a crack of electrodes at terminal portion.
Moreover, when the thickness of the transparent substrate
becomes about 0.2 mm or less, the above-mentioned defects
tend to occur in a high probability even under such stress 50
caused by a step of general handling by workers. To deal with
such problem, the connecting portion of transparent substrate
and a flexible substrate would be coated with resin to rein-
force that portion. However, there would be a problem that the
manufacturability becomes low and thus requiring higher cost 55

In order to try to avoid the above-mentioned problems,
various methods are proposed. For example, a large-sized
polarizing plate is coated on outer surface of an LC panel so
as to extend outside of edges of the transparent substrate to 60
protect the edge portions of the substrate, as disclosed in
Japanese Utility-model application Laid-Open No. 60-94631
and Japanese Patent Publication No. 3799870.

On the other hand, in Japanese Patent Application Laid-
Open No. 2005-338699, a pair of reinforcing tapes is used to 65
sandwich a connecting portion of a flexible substrate and an
LC panel. In Japanese Patent Application Laid-Open No.

2004-62048, a reinforcing tape is also used to cover the edge
portion of an LC panel and bonded to a flexible substrate.

However, in the structure using a large-sized polarizing
plate as disclosed in the above stated former two prior docu-
ments (No. 3799870 and No. 60-94631), there is no protective
function for the flexible substrate, and thus cut and breakup of
a flexible substrate cannot be prevented.

In the structure using a reinforcing tape as disclosed in the
above stated latter two prior documents (No. 2005-338699
and No. 2004-62048), the width of the cited reinforcing tape
is narrower than the flexible substrate, and thus cut and
breakup of the flexible substrate cannot be prevented. This is
because the reinforcing tape does not cover the whole part
where transparent substrate is one, and thus breakage and
lacking of transparent substrate cannot be prevented.

SUMMARY

An exemplary object of the invention is to provide a flat
display module which prevents breakage and lacking of a
substrate at adjacent area of a connecting portion with a
flexible wiring substrate and preventing a cut and breakup of
the flexible wiring substrate itself.

A flat display module according to an exemplary aspect of
the invention, a flexible wiring substrate is connected to a
terminal portion of a flat display panel, and a reinforcing
member is attached to at least one surface of the display panel.
The reinforcing member is made wider than the flexible sub-
strate and is arranged so as to cover those regions extending
from an overlapping region of two substrates of the display
panel to a region extending and reaching the flexible substrate
located outside of the terminal portion.

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary features and advantages of the present inven-
tion will become apparent from the following detailed
description when taken with the accompanying drawings in
which:

FIG. 1A is a plan view showing a structure of an LCD
module according to the first exemplary embodiment of the
present invention;

FIG. 1B is a cross sectional view along X-X' line of FIG.
1A;

FIG. 2A is a plan view showing a structure of an LCD
module according to the second exemplary embodiment of
the present invention;

FIG. 2B is a cross sectional view along X-X' line of FIG.
2A;

FIG. 3A is a plan view showing a structure of the LCD
module according to the third exemplary embodiment of the
present invention;

FIG. 3B is a cross sectional view along X-X' line of FIG.
3A;

FIG. 4A is a plan view showing a structure of the LCD
module according to the fourth exemplary embodiment of the
present invention;

FIG. 4B is a cross sectional view along X-X' line of FIG.
4A;

FIG. 5A is a plan view showing a structure of the LCD
module according to the fifth exemplary embodiment of the
present invention;

FIG. 5B is a cross sectional view along X-X' line of FIG.
5A;

FIG. 6A is a plan view showing a structure of the LCD
module according to the sixth exemplary embodiment of the
present invention;